

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: **Duelli et al.**

Group Art Unit: **2874**

Application Number: **10/098,585**

Filed: **March 15, 2002**

Examiner: **WOOD, Kevin S.**

For: **COMPACT OPTICAL FIBER COUPLER**

DECLARATION UNDER 37 CFR 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

City of Santa Rosa
State of California,


I, Markus Duelli, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

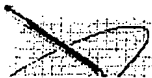
1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
2. Prior to February 17, 2001, I conceived the idea of coupling a compact optical fiber as described and claimed in the application.
3. Attached to this declaration and marked as exhibit A is a copy of an e-mail from co-applicant and co-inventor, Leland Black, to Bob Hallock dated November 15, 2000 and attached file relating to the invention of a single mode fiber – custom Grin fiber assembly including a first optical waveguide having a first terminal end and a second of graded index fiber. The beam propagating through the Grin fiber assembly is shown to have a reduced diameter (waist) at a distance from the terminal end of the graded index fiber.

4. Attached to this declaration and marked as exhibit B is a copy of co-applicant and co-inventor Leland Black's lab notes dated January 2, 2001 containing a sketch illustrating the change from SMF to CMMF.

5. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, and may jeopardize the validity of the application or any patent issuing therefrom.

Sworn at the city of Santa Rosa in the
State of California, this twelfth day of
November, 2003


Markus Duelli



Leland Black

11/15/2000 08:19 AM

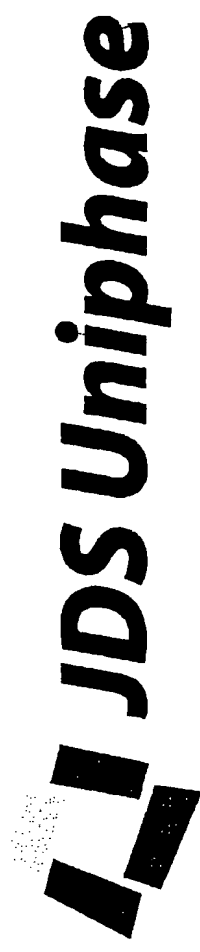
To: Bob Hallock/Saro/OCLI@JDSUniphase

cc:

Subject: Re: Slides for Dave/ Jas visit



Optics Sub-Assembly.pp Optical-Chip Assembly.pp
Leland



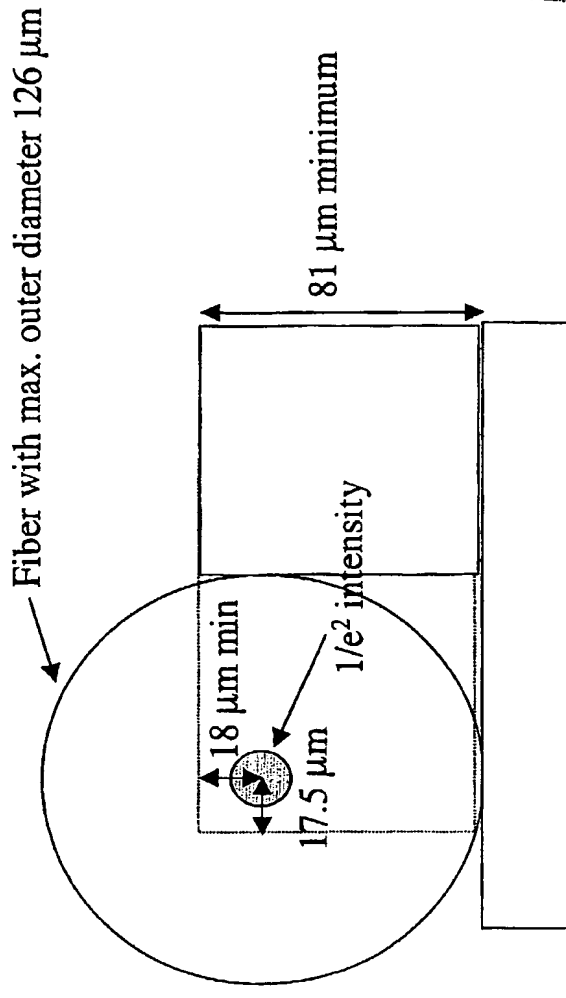
MEMS Optical Sub-Assembly

**Manufacturing Process and
Optical Performance**

Beam Size Limitation

Electrostatic MEMS mirror actuator

- Mirror movement: 35 μm
- Minimum fiber trench depth: 81 μm



For excess loss $< 0.05\text{dB}$ mirror diameter has to be larger than $3.54 \times$ beam waist
 \Rightarrow maximum projected beam waist at mirror ($1/e^2$ -intensity radius) = 9.9 μm

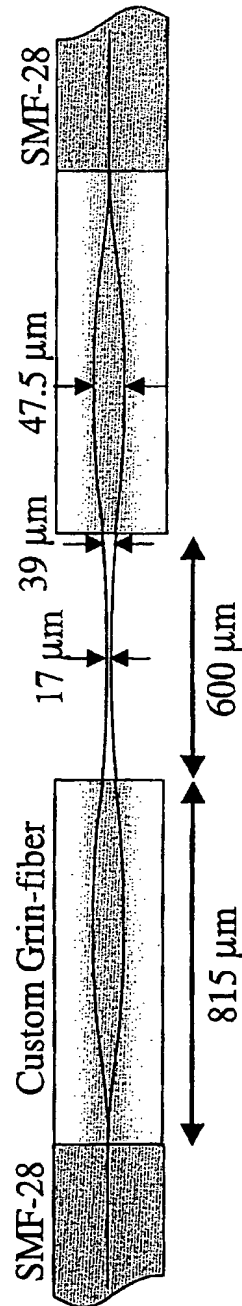
MEMS Product Development

JDS Uniphase

Company Representative

Optics Solution

Single mode fiber - custom Grin fiber assembly
(30 degree angle between fibers)



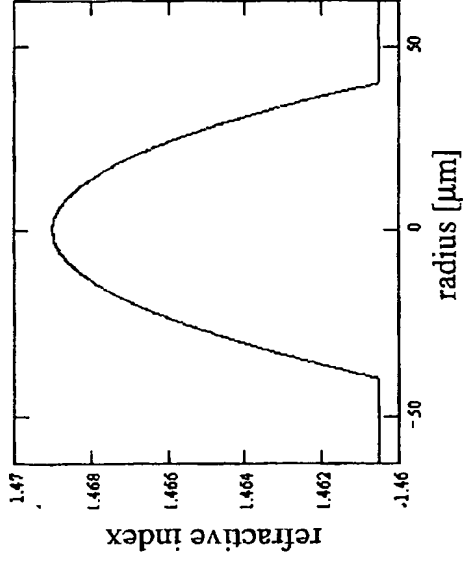
MEMS Product Development

JDS Uniphase

Company Name

Optics Solution - Con't

Gradient index profile:



$$n(r) := n_0 \left(1 - \frac{g^2 \cdot r^2}{2} \right)$$

$$g = 2.7 \text{ mm}^{-1}$$

$$n_0 = 1.469 \text{ (@ } \lambda = 1.55 \mu\text{m)}$$

Return loss (4 degree angle cleave): 76 dB without AR
82 dB with 1% AR

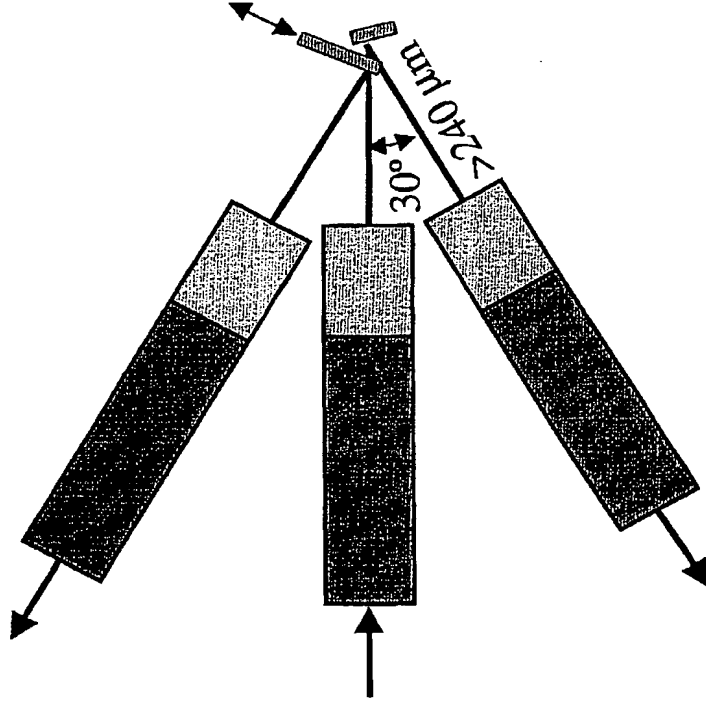
MEMS Product Development

JDS Uniphase

Company Private

Fiber-to-Fiber Working Distance

(30 degree angle between fibers)



126 μm diameter fibers touch at a working distance of 480 μm

\Rightarrow fiber -to-fiber working distance >480 μm

MEMS Product Development

JDS Uniphase

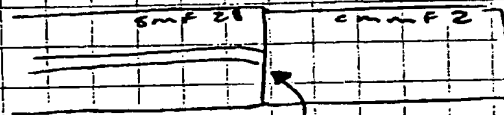
Company Private

TITLE

PROJECT NO.
BOOK NO.

105

Work continued from Page



AS SEEN ON SPURGE

SEEN w/ CMNF 2 BUT NOT CMNF 1

POSSIBLE PROGRAMS

#1 5um PUSH
2um PULL
100ms PREFUSE

→ LOOKED BETTER THEN STANDARD PROGRAM
BUT NOT AS GOOD AS CMNF 1
→ GOOD CLEAVE

#2 3um PUSH
PULL
100ms PREFUSE

→ STILL EXHIBITED PROBLEM, ALSO NECKED @
@ SPURGE JOINT

#3 3um PUSH
PULL
70ms PREFUSE

→ SAME PROBLEM, LESS NECKING @ JOINT

#4 1um PUSH
PULL
30ms PREFUSE

→ LINK LOOKED GOOD BUT NECKED @ JOINT
• DUE TO LOAD GROW CMNF CLEARED TWICE
EXCESSIVE ROUNDING REPEAT

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

1/2/01

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

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Commissioner for Patents
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Alexandria, VA 22313-1450

Sir:

City of Santa Rosa
State of California,


I, Leland Black, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
2. Prior to February 17, 2001, I conceived the idea of coupling a compact optical fiber as described and claimed in the application.
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4. Attached to this declaration and marked as exhibit B is a copy of my lab notes dated January 2, 2001 containing a sketch illustrating the change from SMF to CMMF.

5. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, and may jeopardize the validity of the application or any patent issuing therefrom.

Sworn at the city of Santa Rosa in the
State of California, this twenty-fourth day of
November, 2003



Leland Black

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: **Duelli et al.** Group Art Unit: **2874**Application Number: **10/098,585**Filed: **March 15, 2002**Examiner: **WOOD, Kevin S.**For: **COMPACT OPTICAL FIBER COUPLER**

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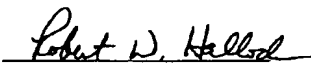
I, Robert W. Hallock, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

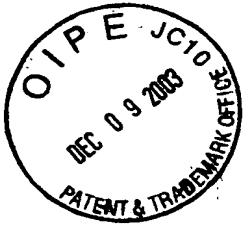
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Sworn at the city of Santa Rosa in the
State of California, this first day of
December, 2003


Robert W. Hallock



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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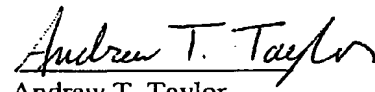
City of Santa Rosa
State of California,

I, Andrew T. Taylor, declare that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true:

1. I am an applicant of the above-identified patent application and an inventor of the subject matter described and claimed therein.
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Sworn at the city of Santa Rosa in the
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November, 2003


Andrew T. Taylor